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PERSONNEL EFFECTIVENESS AND PREMATURE ATTRITION IN THE ALL-VOLU--ETC(U)  
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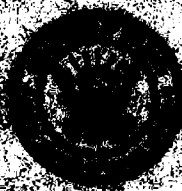
PERSONNEL EFFECTIVENESS AND TRAINING  
IN THE ALL-VOLUNTEER NAVY

E. K. E. GUNDERSON

A. HOIBERG

REPORT NO. 77-16

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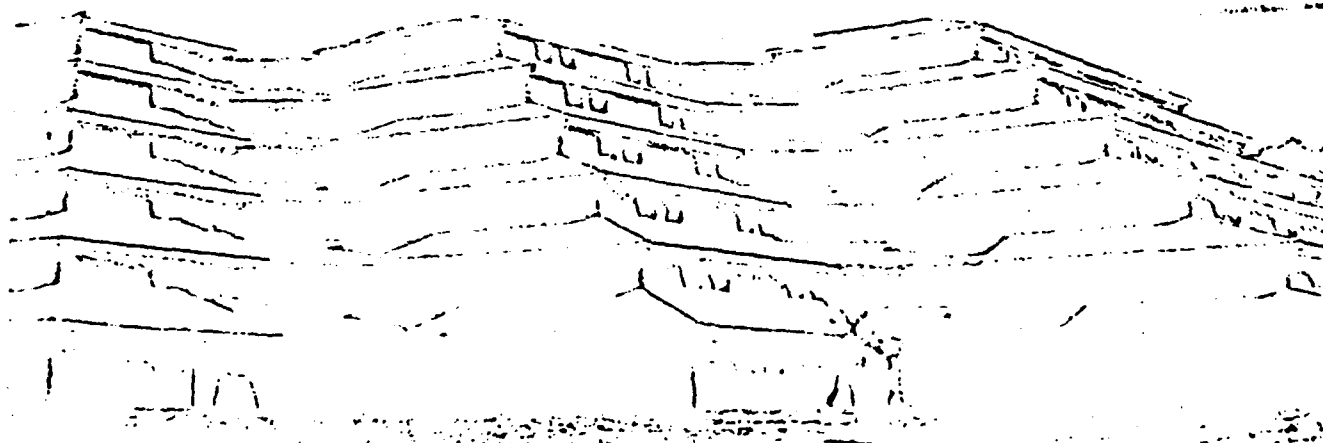
# FIRST TERM ENLISTED ATTRITION

## VOLUME I: PAPERS

JUNE 1977

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Personnel Effectiveness and Premature Attrition  
in the All-Volunteer Navy<sup>1</sup>

E. K. Eric Gunderson<sup>2</sup> and Anne Hoiberg<sup>3</sup>

Naval Health Research Center  
San Diego, California 92152

With the establishment of the All-Volunteer Force (AVF) in 1973, military manpower planners faced the problem of recruiting sufficient numbers of qualified personnel to man Navy ships and support systems without the pressure of the draft. In 1974 Congress imposed the requirement that at least 55% of enlistees must be high school graduates and no more than 18% could be in Mental Group IV (General Classification Test scores below 42) which further restricted the pool of potential applicants. With better pay and unfavorable economic conditions outside the Navy, recruiting quotas have largely been met; however, the end of the effects of the World War II "baby boom" and improved economic conditions signal recruiting difficulties ahead.

Recently, concern has shifted to problems of personnel attrition. Attrition can serve the positive function of separating poor performers from service, but too much turnover wastes recruiting and training investments, impairs organizational effectiveness, and reduces the number of eligible career replacements.

In the Navy attrition rate is primarily a function of (1) personnel quality and (2) organizational conditions and practices. A great deal of research has been devoted to identifying individual characteristics that predict attrition but relatively little to organizational factors that affect attrition. Both of these components or aspects must be considered in efforts to control attrition.<sup>4</sup>

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<sup>2</sup>Head, Environmental and Social Medicine Division.

<sup>3</sup>Head, Health Care Systems Branch, Environmental and Social Medicine Division.

<sup>4</sup>Economic conditions outside the Navy also affect attrition/retention, but such influences are outside the control of the naval organization and will not be considered here.

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Personnel quality and organizational conditions not only affect attrition but also relate to performance effectiveness. Performance ineffectiveness, for example, unauthorized absence, is often a precursor of premature attrition.

The purpose of this study is to examine selected indices of personnel effectiveness and premature attrition during the past decade and, particularly, to compare Navy enlistees on these indicators before and after establishment of the AVF. Rates of unauthorized absence, desertion, demotion, advancement, unfavorable discharge, medical discharge, and overall effectiveness will be considered for enlistees entering the Navy each year from 1966 through 1975. Major occupational groups will be examined separately.

The following specific questions will be addressed: Has there been any change in personnel effectiveness or attrition rate among first-term enlistees since AVF? If there has been a change, was the change Navy-wide or limited to specific occupational groups? Can observed changes in personnel effectiveness be explained by differences in personnel quality (General Classification Test scores)? Are changes in personnel effectiveness paralleled by change in disease and injury rates? What individual, environmental, and organizational factors importantly influence personnel effectiveness and premature attrition?

#### METHOD

Sample. The sample consisted of 525,121 male Caucasian enlistees who entered the Navy during calendar years 1966 through 1975. Most of these individuals were assigned to selected occupational specialties during their first enlistments, but a large number did not attain a designated specialty and remained Seamen, Firemen, or Airmen. The specific occupational categories and the numbers of personnel included are shown in Table 1.

Procedure. The service history data pertaining to occupational classification, personnel effectiveness, and attrition were obtained from Bureau of Naval Personnel computer files reflecting losses and gains from the Navy Enlisted Master Tape. Copies of these tapes were provided by the Naval Personnel Research and Development Center, San Diego. Over the 10-year period this information has been compiled into longitudinal service history records for all Navy enlisted personnel. This file is used in epidemiological research and in long-term follow-up of psychiatric and medical conditions. The service history data used in this study were for the first enlistment only.

Sailors in each occupational category were divided into three groups according to General Classification Test (GCT) scores. These verbal aptitude scores are used as the principal basis for assigning personnel to various Navy schools and occupations and serve here as a general indicator of personnel quality. The three GCT groups or levels were: 1 - 20 to 50; 2 - 51 to 57, and 3 - 58 to 80. These intervals divided the total sample roughly into thirds. After dividing each occupational category into the three GCT levels, percentages or rates were computed for the 30 resulting subgroups (10 occupational categories X 3 GCT levels) on each of the personnel effectiveness indices. These indices reflected the percentages of individuals in each group that met the specific criterion during the first enlistment. The criteria were: (1) having one or more unauthorized absences; (2) being declared a

Table 1  
Percentage Distributions by Occupation, GCT Level,  
and Year of Enlistment

Occupational Group (Specialty)	GCT Level <sup>a</sup>	Year of Enlistment									
		66	67	68	69	70	71	72	73	74	75
Deck (BN, QM, SM) N = 28,974	1	35	33	28	44	35	37	39	38	44	16
	2	29	29	33	30	34	30	28	29	27	36
	3	36	38	39	26	31	32	33	32	29	48
Ordnance (GM, GMT, GMG) N = 10,283	1	27	27	26	34	25	30	33	31	33	20
	2	29	28	31	30	30	33	29	27	34	36
	3	44	45	43	36	45	37	38	43	33	44
Electronics (ET, ETN, ETR) N = 26,196	1	2	2	2	2	2	1	1	2	3	2
	2	10	12	12	16	16	12	7	10	17	10
	3	88	86	86	82	82	87	92	88	80	87
Radio (RM) N = 25,612	1	8	7	9	13	14	16	13	19	30	33
	2	26	28	26	30	35	38	35	39	41	33
	3	66	65	65	57	51	46	52	42	28	34
Clerical (YN, PN, SK, DK) N = 34,993	1	18	17	11	22	17	17	18	19	25	19
	2	28	29	26	31	32	29	29	31	32	35
	3	54	54	63	46	51	54	53	50	42	46
Engine. & Hull (MM, EN, BT, BR) N = 71,972	1	27	30	26	29	18	18	22	28	34	21
	2	30	30	30	27	21	21	22	27	28	27
	3	42	40	45	45	61	62	56	45	38	52
Construction (CU, EA, CE, EQ, EO, CM, BU, SW, UT) N = 27,097	1	30	27	44	44	40	30	21	24	32	32
	2	30	32	25	24	32	34	31	35	36	37
	3	40	42	31	31	28	36	48	42	31	31
Aviation (AD, ADR, ADJ, AM, AMS, AMH, AME) N = 44,244	1	26	20	19	30	27	27	33	28	36	22
	2	34	36	38	39	40	35	33	36	37	40
	3	40	44	43	31	33	38	34	36	27	38
Medical (HM) N = 37,327	1	11	8	12	15	15	10	10	15	9	8
	2	26	25	29	32	33	28	28	33	32	30
	3	62	67	60	54	52	62	62	52	59	62
Nonrated (SN, FN, AN) N = 218,423	1	50	64	64	66	56	55	62	58	69	38
	2	24	19	19	19	23	24	22	24	19	29
	3	25	17	17	14	21	22	16	18	11	33

<sup>a</sup>GCT intervals were as follows: 1 = 20 to 50; 2 = 51 to 57; and 3 = 58 to 80.  
AFQT scores were used instead of GCT scores in 1975.

deserter; (3) receiving one or more demotions; (4) attaining a pay grade of E-5 (Petty Officer Second Class), and (5) being classified as ineffective. Ineffectiveness was defined as (1) premature separation from service because of unsuitability, unfitness, misconduct, or court-martial, or (2) receiving a negative recommendation for reenlistment.

Service history data from Bureau of Naval Personnel loss-gain files were utilized for the period January 1966 through December 1976. Thus, the follow-up periods for men who enlisted in 1973 and 1974 were not complete and percentages of unauthorized absence, desertion, etc., for 1973 and 1974 accessions were underestimated.

### RESULTS

Quality of Personnel. Percentage distributions by GCT level for each occupational category and each year of enlistment are shown in Table 1. For example, accessions for 1966 who were assigned to Deck occupational specialties were distributed as follows: 35% in Level 1 (low), 29% in Level 2 (middle), and 36% in Level 3 (high). The quality of enlistees, as measured by GCT scores, varied considerably among occupational groups but remained relatively stable over time for most specialties. During the 10 years, general decreases in quality were seen in 1969 and 1974.

When occupational categories were examined separately, only two striking or distinctive changes in the distributions of GCT scores were noted. During the decade the Radioman group shifted from one of the highest in quality to one of the lowest. As contrasted with most other groups, percentages in the high GCT level did not decrease in 1969 for the Engineering and Hull group. In fact, personnel quality was highest for this group during 1970 through 1972.

Percentages of Unauthorized Absences and Desertions. Beginning in 1969, percentages of unauthorized absence (UA), shown in Table 2, increased steadily for virtually all occupational categories. Prior to that year, values were mostly in the 2-4% range but by 1973 a high of 28% was reached in the Engineering and Hull group. Of the major occupational categories, excluding the Nonrated group, the highest UA rates occurred in 1973 and 1974 in the Engineering and Hull and Deck specialties. The Engineering and Hull group showed the largest increase in UA rate over the decade and the largest increase after AVF (1973 and 1974).

Percentages UA were considerably higher for the Nonrated group than for the designated occupational groups. The UA rate for Nonrated personnel increased from approximately 15% in 1966 to slightly more than 40% in 1973. The smallest increases in UA rate occurred in the Electronics and Hospital Corpsman specialties.

Percentages of men deserting during the first enlistment, shown in Table 3, paralleled the upward direction found for unauthorized absences, although the increases were substantially smaller in magnitude. Between 1966 and 1969, the desertion rate across designated occupational specialties remained relatively stable within a narrow range from 0-2%. The desertion rate for Non-

## All-Volunteer Navy

Table 2

Unauthorized Absence Rate by Occupation,  
GCT Level, and Year of Enlistment

Occupational Group (Specialty)	GCT Level <sup>a</sup>	Year of Enlistment									
		66	67	68	69	70	71	72	73	74	
Deck (BM, QM, SM)	1	8	7	7	10	13	10	12	20	15	
	2	6	6	8	9	12	12	16	18	15	
	3	4	5	6	7	9	10	12	19	13	
Ordnance (GM, GMT, GMG)	1	5	5	5	6	8	13	7	11	7	
	2	2	6	5	4	8	10	6	14	7	
	3	2	2	4	5	5	7	12	12	11	
Electronics (ET, ETN, ETR)	1	--	--	--	--	--	--	--	--	--	
	2	0	0	1	2	2	5	5	5	4	
	3	1	2	1	2	3	4	6	5	4	
Radio (RM)	1	2	2	2	4	4	7	8	14	11	
	2	1	3	2	4	6	9	9	14	8	
	3	2	2	2	3	4	6	9	11	7	
Clerical (YN, PN, SK, DK)	1	1	1	2	4	5	5	8	12	6	
	2	1	2	2	4	4	5	6	12	8	
	3	1	1	2	3	3	4	6	9	6	
Engine. & Hull (MM, EN, BT, BR)	1	6	6	7	8	10	13	17	28	23	
	2	5	6	6	8	10	13	19	26	22	
	3	3	5	5	5	7	10	14	17	12	
Construction (CU, EA, CE, EQ, EO, CM, BU, SW, UT)	1	2	2	2	2	5	6	8	9	5	
	2	1	1	2	2	5	7	9	7	4	
	3	1	2	1	1	4	4	8	8	4	
Aviation (AD, ADR, ADJ, AM, AMS, AMH, AME)	1	2	2	2	4	5	6	8	14	11	
	2	1	2	2	6	5	6	9	12	10	
	3	1	2	2	4	5	7	8	13	8	
Medical (HM)	1	1	2	4	5	4	5	8	8	5	
	2	2	3	4	5	5	5	8	6	6	
	3	2	2	3	4	4	4	5	6	4	
Nonrated (SN, FN, AN)	1	15	12	10	14	19	22	35	41	29	
	2	15	13	13	18	20	23	32	42	32	
	3	11	12	13	15	17	18	26	37	30	

<sup>a</sup>GCT intervals were as follows: 1 = 20 to 50; 2 = 51 to 57; and 3 = 58 to 80.



rated sailors, on the other hand, was about 7% for the period 1966-1968, increased to 10% during 1969 and 1970, and increased again rather sharply to 21% during 1973.

From 1970 to 1972, only slight increases in desertions occurred in most specialties but in 1973 definite increases in almost all occupations are apparent. The largest increase occurred in the Engineering and Hull category, and it can be seen that this relatively high rate is sustained in 1974 and 1975, even though the periods of follow-up were shorter for those years. The smallest percentages were found in the Electronics and Hospital Corpsman specialties.

Demotion Rates. The percentages receiving demotions during the first enlistment were computed for all occupational groups, GCT levels, and years. The results generally paralleled those for UA and desertion (and are not shown here) with small increases in demotion rate shown for all occupational groups from 1966 to 1972 and 1973. The highest demotion rates in 1973 were in the Nonrated, Engineering and Hull, and Deck categories while the lowest rates were in the Electronics and Hospital Corpsman specialties.

Advancements. The percentage attaining E-5 during the first enlistment was not meaningfully related to other indicators of personnel effectiveness but was highly dependent upon GCT level. Within all occupational specialties, the largest percentages achieving Second Class Petty Officer status during the first enlistment were in the highest GCT levels.

Overall Ineffectiveness. The composite indicator of ineffectiveness, based upon an unfavorable discharge or a negative recommendation for reenlistment, showed large increases over the 8-year period. Those results are shown in Table 4. For almost all occupations, the highest rate of ineffectiveness occurred in 1973. The highest rate among designated occupations was in the Engineering and Hull group. The Nonrated group reached a high of 71% classified as ineffective in 1973.

Attrition Rates. Increases in premature attrition during recent years are shown in Table 5. These rates are based upon all enlisted Male Caucasians discharged during the years indicated. The rate of Unsuitable type discharges increased almost three-fold while the rate of Unfit, Undesirable, and Bad Conduct discharges doubled during the period shown, presumably reflecting higher rates of personnel ineffectiveness for men enlisting in the early 1970's. The rate of medical discharges remained stable with a high of 4.6% in 1974.

High Risk Occupations. It is apparent from the foregoing results that the Engineering and Hull and Deck occupational groups present relatively high risks with respect to UA and desertion. Recent studies of medical inpatient data have indicated that hospitalization rates also tend to be high for Engineering personnel, particularly Boiler Technicians. In order to pursue this relationship further, UA and desertion rates were examined separately for the Boiler Technicians included in this study and compared with rates for all other occupational groups combined. These results are shown in Figure 1. It can be seen that the UA and desertion rates for Boiler Technicians were much higher than the rates for other sailors, particularly in 1973 and 1974, after the advent of AVF. (Again, it is noted that the values for 1974 and

## All-Volunteer Navy

Table 3

Desertion Rate by Occupation, GCT Level,  
Year of Enlistment

Occupational Group (Specialty)	GCT Level <sup>a</sup>	Year of Enlistment									
		66	67	68	69	70	71	72	73	74	75
Deck (BM, QM, SM) N = 28,974	1	1	1	1	1	3	2	2	4	3	8
	2	0	1	2	1	2	2	3	8	7	10
	3	1	1	2	2	1	2	3	8	8	6
Ordnance (GM, GMT, GMG) N = 10,283	1	1	1	1	2	1	2	2	2	3	7
	2	0	1	1	1	1	3	2	2	6	4
	3	1	1	1	1	1	1	3	2	4	5
Electronics (ET, ETN, ETR) N = 26,196	1	--	--	--	--	--	--	--	--	--	--
	2	--	1	0	0	1	1	1	3	2	0
	3	0	1	1	1	1	1	3	2	2	1
Radio (RM) N = 25,612	1	--	--	--	1	2	2	4	6	4	2
	2	0	1	0	1	2	3	3	6	5	2
	3	0	0	0	1	1	2	3	3	5	2
Clerical (YN, PN, SK, DK) N = 34,993	1	0	0	0	1	2	1	1	6	3	2
	2	0	0	0	1	2	2	2	4	4	3
	3	0	0	0	1	1	2	2	5	5	2
Engine. & Hull (MM, EN, BT, BR) N = 71,972	1	1	0	1	1	2	3	5	12	14	15
	2	1	1	1	2	2	5	7	12	14	15
	3	1	2	2	2	3	4	6	8	9	8
Construction (CU, EA, CE, EQ, EO, CM, BU, SW, UT) N = 27,097	1	1	0	1	1	1	2	2	2	2	2
	2	0	0	1	1	2	1	2	3	4	2
	3	0	1	0	0	0	1	3	2	3	--
Aviation (AD, ADR, ADJ, AM, AMS, AMH, AME) N = 44,244	1	0	0	0	1	2	2	3	4	4	1
	2	0	0	0	2	2	2	3	5	4	2
	3	0	0	0	1	2	2	3	4	4	2
Medical (HM) N = 37,327	1	0	2	1	1	1	1	3	4	2	--
	2	0	1	1	1	2	1	3	2	2	0
	3	0	1	1	1	1	1	2	2	1	0
Nonrated (SN, FN, AN) N = 218,423	1	8	6	4	8	9	11	18	21	18	6
	2	7	8	7	11	11	13	16	21	18	5
	3	7	8	7	10	11	11	15	17	15	3

<sup>a</sup>GCT intervals were as follows: 1 = 20 to 50; 2 = 51 to 57; and 3 = 58 to 80.  
AFQT scores were used instead of GCT scores in 1975.

Table 4

Rate of Ineffectiveness by Occupation,  
GCT Level, and Year of Enlistment

Occupational Group (Specialty)	GCT Level <sup>a</sup>	Year of Enlistment							
		66	67	68	69	70	71	72	73
Deck (BM, QM, SM)	1	4	7	8	9	9	7	7	8
	2	5	9	10	12	11	12	10	15
	3	4	10	13	14	15	13	13	18
Ordnance (GM, GMT, GMG)	1	4	8	7	7	9	5	6	5
	2	4	7	9	10	11	8	9	11
	3	4	8	10	9	10	10	12	13
Electronics (ET, ETN, ETR)	1	--	--	--	--	--	--	--	--
	2	3	7	8	12	10	9	7	10
	3	5	10	11	12	13	10	14	10
Radio (RM)	1	4	9	9	12	15	12	13	17
	2	5	8	10	14	17	15	16	17
	3	4	8	11	14	13	12	14	18
Clerical (YN, PN, SK, DK)	1	3	6	6	7	7	7	6	10
	2	3	6	7	10	10	9	11	14
	3	3	6	8	12	9	9	11	15
Engine. & Hull (MM, EN, BT, BR)	1	4	7	7	11	8	10	16	24
	2	5	9	9	14	13	15	21	27
	3	5	11	13	15	16	16	18	20
Construction (CY, EA, CE, EQ, EO, CM, BU, SW, UT)	1	2	9	14	17	20	15	18	16
	2	2	9	9	8	15	14	19	17
	3	2	6	8	8	13	12	15	15
Aviation (AD, ADR, ADJ, AM, AMS, AMH, AME)	1	5	9	10	14	11	10	14	15
	2	4	7	10	15	14	12	17	16
	3	4	9	10	15	12	12	17	15
Medical (HM)	1	10	18	19	19	17	15	19	22
	2	8	13	19	21	16	15	20	15
	3	8	13	16	19	14	14	14	13
Nonrated (SN, FN, AN)	1	57	52	59	68	62	49	58	71
	2	56	64	66	67	60	58	60	70
	3	56	70	69	67	62	60	62	67

<sup>a</sup>GCT intervals were as follows: 1 = 20 to 50; 2 = 51 to 57; and 3 = 58 to 80.

Table 5

Rates (Percents) of Premature Attrition  
for Navy Enlisted Personnel  
by Type of Discharge and Year of Discharge

<u>Type of Discharge</u>	<u>Year of Discharge</u>					
	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Unsuitable	5.4	6.7	7.5	7.3	11.3	15.4
Unfit, Undesirable, Bad Conduct	4.0	6.6	8.6	5.0	7.3	8.1
Medical, Disability Retired	4.0	3.8	4.4	4.2	4.6	4.2

1975 are underestimates because of the shorter periods of follow-up for men enlisting in those years.)

#### DISCUSSION

The results have shown that personnel ineffectiveness, as measured by UA and desertion rates and other indicators, and premature attrition have increased sharply among Caucasian enlisted men during the past few years. This general decline in performance effectiveness began before, and continued after, AVF.

All occupations showed some decline in effectiveness, but much greater changes were evident in certain occupational groups than others, namely, Engineering and Hull and Deck. The greatest increment in UA and desertion rates for the Engineering and Hull group was during the first year of the AVF--1973. The Boiler Technician rating group particularly showed large increases in UA and desertion rates. In contrast, there was relatively little change in the Hospital Corpsman group, and this was the only occupational group that did not show increases in UA and desertions at the beginning of AVF.

The observed changes in personnel effectiveness cannot be explained by differences in personnel quality as measured by GCT scores. There was little, if any, relationship between GCT level and rates of UA and desertion. That is, within most occupational groups there was no consistent association between GCT level and UA or desertion rate. Only in the Nonrated and Engineering and Hull occupational groups for 1972 and 1973, respectively, was there clearly a difference between high and low GCT groups in UA rate. This result is perhaps sur-

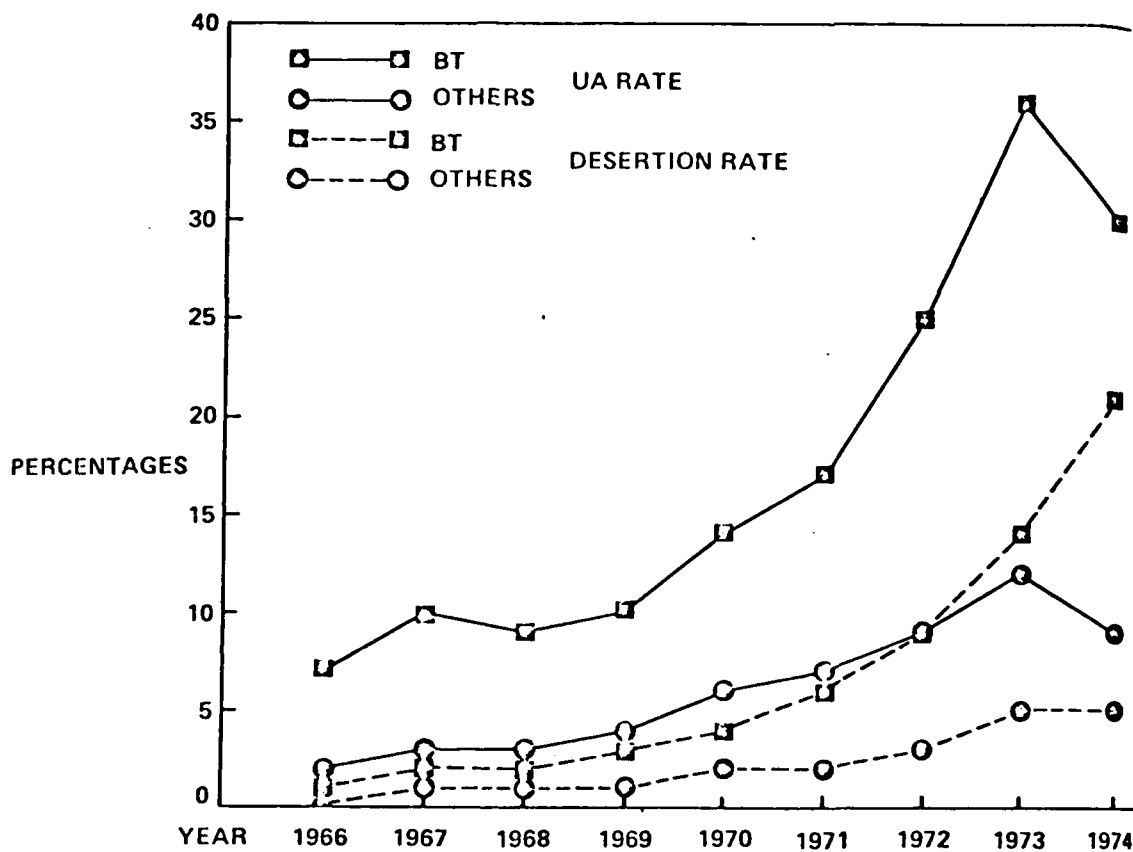


Figure 1. Comparison of UA and desertion rates for boiler technicians versus other occupational groups by year of enlistment.

prising in view of consistent findings over many years that GCT scores correlate with ineffective performance. In the present study, however, we are looking at the relationship within homogeneous occupational groups rather than across heterogeneous occupational groups. The only performance indicator consistently predicted by GCT level in this study was percent attaining E-5 or above. Thus, within occupational groups, GCT predicted superior performance during first enlistment but not ineffective performance (UA or desertion).

There is evidence from recent medical studies that the high rates of UA, desertion, and attrition for Boiler Technicians are paralleled by a high rate of hospital admissions and that the hospitalization rate for this group has increased since AVF. In 1970-1971 Boiler Technicians had a 20% higher hospital admission rate than other enlisted occupations; in 1974-1975 this differential had increased to 36%. These medical findings suggest that job stresses have increased for Boiler Technicians during recent years.

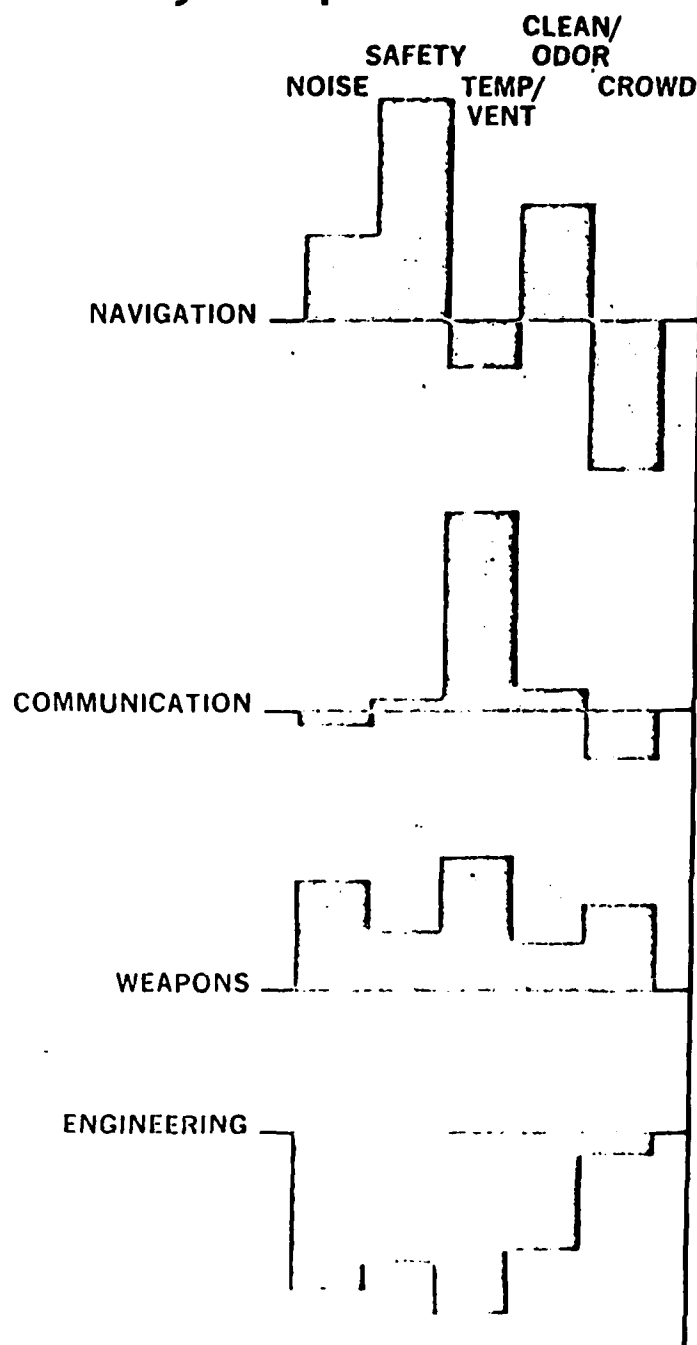
In current studies of environmental and organizational determinants of illness and injury rates aboard 18 destroyer-type ships, Boilers and Machinery (Engineering) and Deck division personnel have been found to have much higher morbidity rates than other groups. At the same time crew members' perceptions of their work environments and organizational climates in these divisions are quite different from perceptions in other divisions. For example, in Figure 2 it can be seen that Engineering personnel perceived their work environments as very unfavorable. Mean values for five environmental scales are compared for four types of departments or divisions--Navigation, Communications, Weapons, and Engineering. Values above the mid-line represent favorable environmental conditions while values below the mid-line represent unfavorable working conditions. Engineering personnel report their work areas to be noisy, unsafe, hot, and dirty but not crowded.

In Figure 3 working conditions are compared for divisions within two departments--Weapons and Engineering. Boiler (B) and Machinery (M) divisions within the Engineering Department reported extremely hot, dirty, noisy, and unsafe conditions compared with other divisions. Note that the Deck divisions within the Weapons Department reported relatively favorable environmental conditions on most scales.

In studies of organizational climate aboard ship it has been shown that Boilers and Machinery divisions and Deck divisions--particularly the latter--tend to have unfavorable division climates. In Figure 4 it can be seen that Boilers/Machinery and Deck personnel perceived more conflict and ambiguity than most other divisions; the Deck divisions perceived extremely low Job Challenge; Leader Support was perceived as low by Deck division personnel, and both types of divisions reported very low levels of Workgroup Cooperation, Friendliness, and Warmth. The latter climate dimensions, Leader Support and Workgroup Cooperation, have correlated importantly with measures of division performance effectiveness, illnesses and injuries, job satisfaction, and reenlistment decisions in our studies to date.

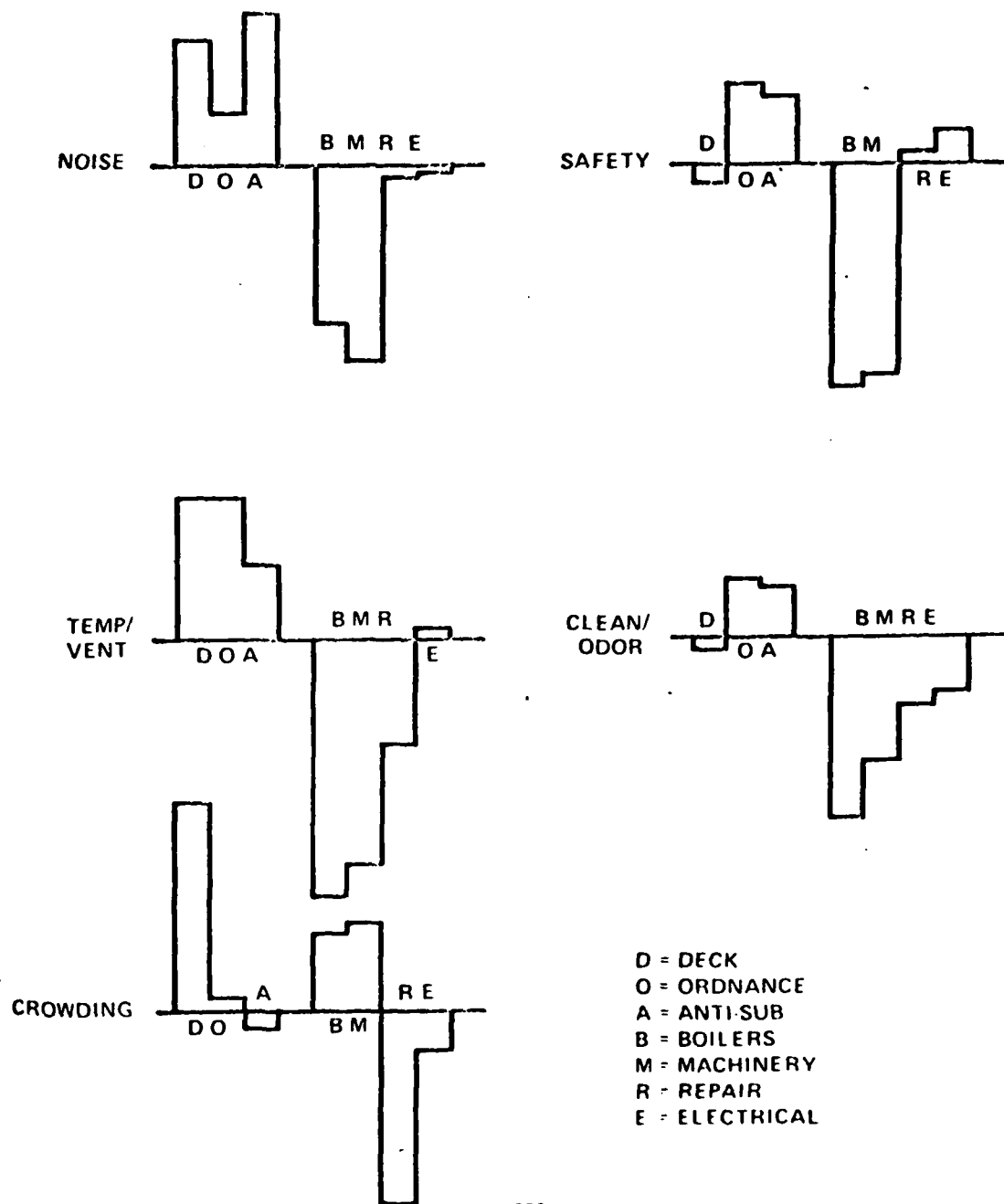
Finally, Figure 5 shows the relationship between perceived safety and actual injury rate for divisions aboard ship. Mean ratings of safety in work areas for various divisions are plotted on the abscissa and injury rates on

Fig. 2 Habitability Perceptions Deviation From Ship Norms



\*HIGH SCORES REPRESENT FAVORABLE HABITABILITY

Fig. 3 VARIATION OF HABITABILITY PERCEPTIONS  
FOR DIVISIONS WITHIN WEAPONS  
DEPARTMENTS AND ENGINEERING



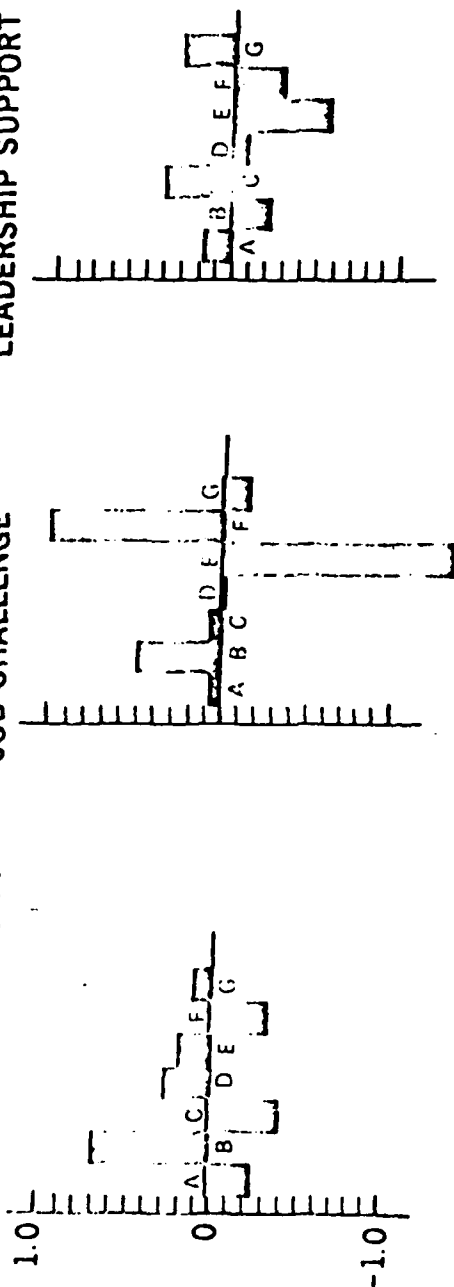


# ORGANIZATIONAL CLIMATE PROFILES FOR DIVISION TYPES

CONFLICT AND AMBIGUITY

JOB CHALLENGE

LEADERSHIP SUPPORT



WORKGROUP COOPERATION PROFESSIONAL ESPRIT DE CORPS JOB STANDARDS

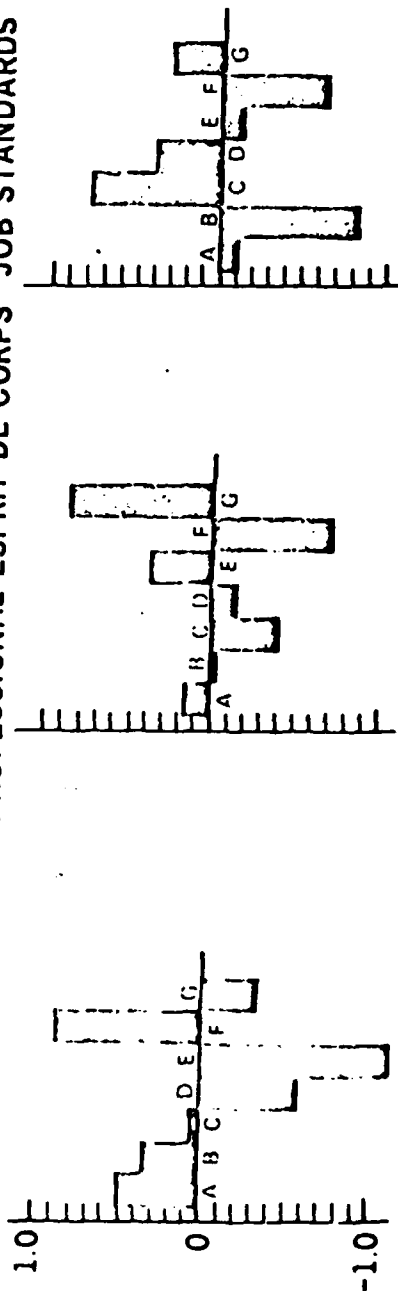
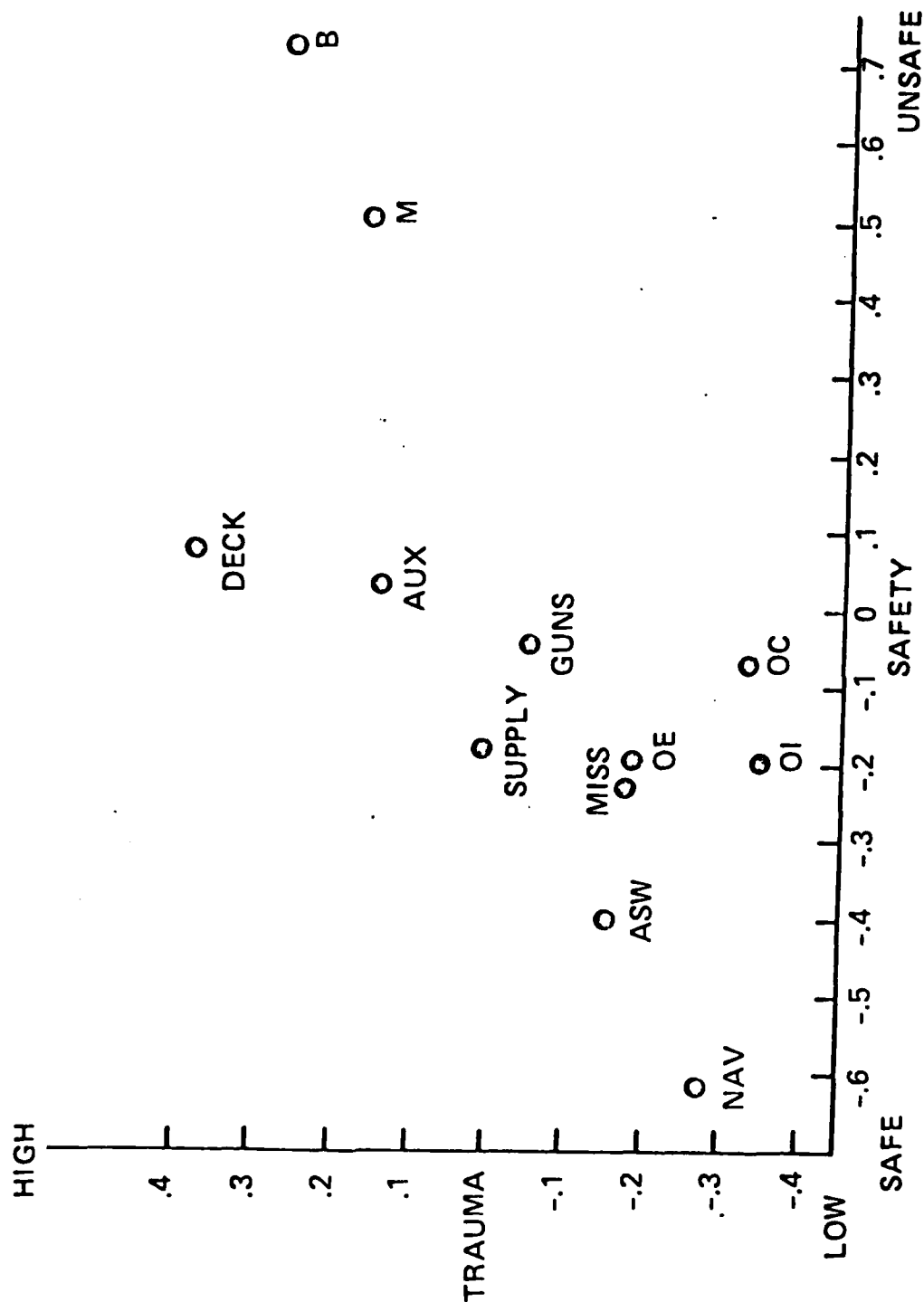


FIG. 4 A. NAVIGATION, ORDNANCE, ANTISUBMARINE WARFARE B. FIRE CONTROL, REPAIR, ELECTRICAL, AUXILIARY, MISSILES C. COMMUNICATIONS, INTELLIGENCE D. BOILERS, MACHINERY E. DECK F. ELECTRONICS G. SUPPLY  
NOTE: ALL SCORES ARE STANDARDIZED DEVIATIONS FROM THE MEAN.

FIG. 5 Relationship of Perceived Safety to Accident Rate  
for Shipboard Divisions



the ordinate. Boilers (B) and Machinery (M) division personnel not only perceived their work areas as very unsafe but in fact during the next 7 months of an overseas deployment incurred relatively high injury rates. The Deck divisions did not perceive their work areas as unsafe but, nevertheless, experienced the highest injury rate of any division. Our interpretation of these and other results is that physical hazards are the most important determinants of injury rates in Engineering spaces but that unfavorable leadership and personnel utilization factors may be the most important contributors in Deck division.

On a subsample of seven ships for which disciplinary data were available, it was found that not only illness rates but disciplinary rates and job dissatisfaction were exceptionally high in Boilers, Machinery, and Deck divisions.

The hostile and hazardous nature of their work environment may help explain why many Boiler Technicians want to avoid their work situations, including going UA. Similarly, the monotonous nature of routine maintenance duties (cleaning, painting, and repair), coupled with leadership inexperience or indifference, could partly account for the high rate of behavioral problems among Deck personnel.

During the past three decades there has been a great deal of research on selection or screening techniques to reduce disciplinary and psychiatric problems and premature separation from the service. For example, 20 years ago the results of an ONR-supported study of 20,000 recruits who entered service in 1954 showed that age at enlistment, education, GCT, AFQT, and attitude inventory, called the Navy Delinquency Scale, predicted premature attrition (Gunderson and Ballard, 1956). A combination of age at enlistment, education, and Delinquency score provided probability tables that were moderately useful for identifying high risk recruits.

Plag and Goffman (1966) studied 10,000 Navy recruits who enlisted in 1960 and 1961 and developed probability tables, called Odds-for-Effectiveness, based upon four items: aptitude score, education, suspension or expulsion from school, and pre-service arrest record. These tables have been used in the past by recruiters to screen applicants. The tables recently were revised and updated by the Naval Personnel Research and Development Center in San Diego, and other studies have been done at NPRDC of biographical and attitudinal variables that predict delinquency and attrition.

Lockman (1976) recently reported a study of attrition during the first year of service and showed that education, aptitude score, age at enlistment, race, and primary dependents were valid predictors.

Many other similar studies have been conducted with highly consistent results. In this area the problem is not lack of knowledge but rather lack of utilization or application of this knowledge.

In the area of analysis of situational influences, such as physical environment and organizational structure and climate, on health, premature attrition, personnel effectiveness, and reenlistment, a substantial amount of work has been done during the last few years at the Naval Health Research Center with the help of an ONR-sponsored team from Texas Christian University and at the Naval Personnel Research and Development Center with the help of

a team from the University of Michigan. It is clear from our studies aboard deployed ships in the Atlantic and Pacific Fleets that organizational conditions have an important impact not only on illness and injury rates but on personnel effectiveness and retention. It has not been useful to use the data profile for the whole ship as the unit of analysis because of the great variability among different types of divisions within the ship. Deck divisions from different ships are more alike than Deck divisions and other divisions from the same ship. Thus, the division is the proper unit of analysis for most of our studies of environmental and organizational influences and is the proper level to take action with respect to personnel coordination and control problems and prevention of accidents, UA, and premature attrition.

#### SUMMARY

Several indices of personnel effectiveness, including unauthorized absence, desertion, demotion, advancement, and being classified as ineffective, and rates of premature attrition were examined for all Navy male Caucasian enlistees during the period 1966 through 1974. UA and desertion rates increased for most occupational specialties during 1970 through 1974 and increased sharply for Engineering and Hull personnel, particularly Boiler Technicians. Boiler Technicians also have shown increased hospitalization rates over the same period. Increases in personnel ineffectiveness and premature attrition could not be attributed to changes in personnel quality (aptitude scores). Studies of environmental and organizational conditions aboard operational combat ships have indicated very unfavorable crew members' perceptions of working conditions, including physical environment, leadership support, and personnel utilization and cooperation, for those occupational groups that have shown greatest increases in personnel ineffectiveness and premature attrition. More attention needs to be given to organizational conditions and practices as determinants of attrition.

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declined among Navy enlisted men, and this decline began before and continued after AVF. Engineering and Hull personnel, particularly Boiler Technicians, and Deck personnel showed the largest increases in UA and desertion rates. Boiler Technicians also have shown increases in hospital admissions over the same period. Recent studies aboard ship have identified important environmental and organizational stresses that affect personnel effectiveness and health.

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